

DETAILED ACTION

Priority

1. Acknowledgment is made of Applicant's claim for foreign priority to Japanese Patent Application Nos. 2002-005370 (filed on January 11, 2002), 2002-005381 (filed on January 11, 2002), and 2002-337400 (filed on November 21, 2002), under 35 U.S.C. 119(a)-(d). A certified copy of that application has been received.

Claim Objections

2. Claims 4-6 and 8-15 are objected to because of the following informalities:

- Claims 4-5 and 15-16 use "the said" when referring to elements recited in a previous claim. It is suggested that the Applicant use either "the" or "said" in this context.
- Claims 5-6 and 8-15 recite "... for fuel cell ...". It appears that this phrase should be -- for *a* fuel cell --.
- Claim 8 recites "... supporting catalyst component ...". It appears that this phrase should be -- supporting *a* catalyst component --.

Appropriate correction is required.

Claim Analysis

3. As currently presented, claims 1-15 recite the components of a water repellant carbonaceous material, the components of a carbonaceous material for a fuel cell, and how those materials are produced in a general manner. However, if Applicant submits amendments that significantly expand upon the above-described elements, restriction of any ensuing claims may be warranted.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-2 and 6-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsujioka et al., U.S. Patent No. 5,578,361.

Regarding claims 1 and 6-7, product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. See MPEP § 2113. Therefore, these limitations have not been given patentable weight.

However, as to claim 1, Tsujioka discloses a water repellent carbonaceous material (Title; Abstract; 2:64-3:4) obtained by contacting a carbonaceous material with a water repellent material in a melted state (3:27-33).

Regarding claim 2, the reference discloses a method for producing a water repellent carbonaceous material characterized in that a water repellent material in a melted state is contacted with a carbonaceous material (Title; Abstract; 2:64-3:4, 3:27-33).

Regarding to claim 6, the reference discloses that the water repellent material is a fluorocarbon resin [polytetrafluoroethylene (PTFE)] (Abstract).

Regarding claim 7, the reference discloses a dispersion containing a water repellent carbonaceous material of claim 1 (3:41-44).

6. Claims 3-6 and 14-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Shimizu et al., U.S. Patent No. 6,156,453.

Regarding claims 3 and 5-6, product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. See MPEP § 2113. Therefore, these limitations have not been given patentable weight.

Further, if the body of a claim fully and intrinsically sets forth all of the limitations of the claimed invention, and the preamble merely states, for example, the purpose or intended use of the invention,

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rather than any distinct definition of any of the claimed invention's limitations, then the preamble is not considered a limitation and is of no significance to claim construction (e.g., *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305, 51 USPQ2d 1161, 1165 (Fed. Cir. 1999); *Rowe v. Dror*, 112 F.3d 473, 478, 42 USPQ2d 1550, 1553 (Fed. Cir. 1997). See MPEP § 211.02 (II).

However, as to a carbonaceous material for a fuel cell, Shimizu discloses a battery (e.g., a fuel cell) that uses electroconductive carbonaceous materials (1:37-39, 8:27-30).

Regarding claim 3, Shimizu discloses a carbonaceous material for a fuel cell obtained by dropping a water repellent material solved in an organic solvent to a water dispersion of a carbonaceous material (Abstract; 8:28-31, 8:48-53; claim 6).

Regarding claim 4, the reference discloses a method for producing a water repellent carbonaceous material characterized in that water repellent finish is conducted by dropping a water repellent material solved in an organic solvent to a water dispersion of a carbonaceous material (Abstract; 8:48-53; claim 6).

Regarding claim 5, the reference teaches that the carbonaceous material is at least one of carbon black and graphite (1:37-39).

Regarding claim 6, the reference discloses that the water repellent material is a fluorocarbon resin [tetrafluoroethylene-perfluoro (alkyl vinyl ether) copolymer or a non-fibril-forming tetrafluoroethylene polymer] (Abstract).

Regarding claim 14, the limitations recited in this claim have been addressed above with respect to claim 5.

Regarding claim 15, the limitations recited in this claim have been addressed above with respect to claim 6.

7. Claims 1-4, 5-9 and 14-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Maeda et al., Japanese Patent No. 07-211324 (refer to machine translation).

Regarding claims 1, 3, 5-9 and 14-15, product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. See MPEP § 2113. Therefore, these limitations have not been given patentable weight.

Further, as to claims 3, 5-6, 8-9 and 14-15, if the body of a claim fully and intrinsically sets forth all of the limitations of the claimed invention, and the preamble merely states, for example, the purpose or intended use of the invention, rather than any distinct definition of any of the claimed invention's limitations, then the preamble is not considered a limitation and is of no significance to claim construction. See MPEP § 211.02 (II). However, as to claims 3, 5-6, 8 and 14-15, Maeda discloses a carbonaceous material for a fuel cell (i.e., a catalyst bed) (Abstract; para. 1).

Regarding claim 1, Maeda discloses a water repellent carbonaceous material (Abstract) obtained by contacting a carbonaceous material with a water repellent material in a melted state (para. 14).

Regarding claim 2, the reference discloses a method for producing a water repellent carbonaceous material characterized in that a water repellent material in a melted state is contacted with a carbonaceous material (Abstract; para. 14, 32-33).

Regarding claim 3, the reference discloses a carbonaceous material for a fuel cell obtained by dropping a water repellent material solved in an organic solvent to a water dispersion of a carbonaceous material (Abstract; para. 14, 35).

Regarding claim 4, the reference discloses a method for producing a water repellent carbonaceous material characterized in that water repellent finish is conducted by dropping a water repellent material solved in an organic solvent to a water dispersion of a carbonaceous material (para. 14, 35).

Regarding claim 5, the reference teaches that the carbonaceous material is at least one of carbon black and graphite (Abstract; para. 18).

Regarding to claim 6, the reference discloses that the water repellent material is a fluorocarbon resin [polytetrafluoroethylene (PTFE)] (Abstract).

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Regarding claim 7, the reference discloses a dispersion containing a water repellent carbonaceous material of claim 1 (para. 35).

Regarding claim 8, the reference discloses a material for fuel cell obtained by supporting a catalyst component on the water repellent carbonaceous material (Abstract).

Regarding claim 9, the reference discloses an electrode for fuel cell containing a material for fuel cell of claim 8 (Abstract).

Regarding claim 14, the limitations recited in this claim have been addressed above with respect to claim 5.

Regarding claim 15, the limitations recited in this claim have been addressed above with respect to claim 6.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
10. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsujioka et al.

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Regarding claim 3, product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. See MPEP § 2113. Therefore, these limitations have not been given patentable weight.

Further, if the body of a claim fully and intrinsically sets forth all of the limitations of the claimed invention, and the preamble merely states, for example, the purpose or intended use of the invention, rather than any distinct definition of any of the claimed invention's limitations, then the preamble is not considered a limitation and is of no significance to claim construction. See MPEP § 211.02 (II).

As to claim 3, Tsujioka teaches a carbonaceous material (2:66-3:4).

11. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsujioka et al. as applied to claim 1 above, further in view of Shimizu et al.

Tsujioka and Shimizu are applied and incorporated herein for the reasons above.

Regarding claim 5, Tsujioka teaches the carbonaceous material can be a carbon material (2:66-3:4).

However, Tsujioka does not expressly teach that the carbonaceous material is at least one of carbon black, graphite and carbon fiber.

Shimizu teaches that when producing an electrochemical device (i.e., a battery), active materials are bound to electroconductive carbonaceous materials, for example, carbon blacks, to produce an electrode (1:37-40).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use carbon blacks as the carbonaceous material of Tsujioka because the use of these materials are well known in the art for their electro-conductive properties.

12. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsujioka et al. as applied to claim 1 above, further in view of Maeda et al., Japanese Patent No. 7-211324 (refer to machine translation).

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Regarding claim 8, Tsujioka teaches the water-repellant composite grains prepared by a liquid phase method are applied to and adhered to a surface of a substrate, such as aluminum or nickel (3:66-4:4, 6:24-27).

However, Tsujioka does not expressly teach a material for fuel cell obtained by supporting a catalyst component on the water repellent carbonaceous material.

In Maeda, it is disclosed that a catalyst layer is formed by carrying a catalyst on the surface of a carbonaceous material and by mixing it with a binder resin and applying it on an electrolyte membrane (see p. 2 of the application).

One of ordinary skill in the art at the time of the invention would have found it obvious to support a catalyst on the surface of the water-repellant carbonaceous material of Tsujioka because its use as an electrode catalyst constituent in a fuel cell can improve cell efficiency and extend the life-span of the catalyst (see machine translation of Maeda et al., para. 9-11).

Regarding claim 9, Tsujioka does not expressly teach an electrode for fuel cell containing a material for fuel cell of claim 8.

However, Maeda et al. teaches the use of the catalyst layer described above as an electrode material (refer to machine translation; Title; para. 12).

Thus, it would have been to one of ordinary skill in the art at the time of the invention would have found it obvious to use the water-repellant carbonaceous material of Tsujioka, as modified by Maeda cited above, as an electrode for the reasons described above in the discussion of claim 8.

13. Claims 10 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Tsujioka et al. as applied to claim 1 above, further in view of Applicant's admitted prior art (i.e., Kato, Japanese Patent No. 10-261421 cited on p. 2).

Tsujioka is applied and incorporated herein for the reasons above.

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Regarding claims 10, product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. See MPEP § 2113. Therefore, these limitations have not been given patentable weight.

However, as to claim 10, Tsujioka does not expressly teach that a gas diffusion layer for a fuel cell is obtained by blending the water repellent carbonaceous material of claim 1 with a binder resin and impregnating it to a porous material.

Kato, cited by Applicant as prior art, teaches the formation of a gas diffusion layer material where a layer of fluorine resin and carbon black is formed in the surface of a carbon fiber woven fabric (Abstract).

Therefore, one of ordinary skill in the art at the time of the invention would have obvious to use the water-repellant carbonaceous material of Tsujioka in the preparation of a gas diffusion layer, as taught by Kato, to prevent the flooding of the catalyst layer due to humidifying water and water generated by cell operation (see Kato, Abstract).

Regarding claim 12, the limitations recited in this claim have been addressed above with respect to claim 10.

14. Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsujioka et al. as applied to claims 1 and 7 above, further in view of Gyoten et al. (International Publication No. WO 01/18895; refer to U.S. Patent No. 7,005,205 as a translation).

Regarding claim 11, product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. See MPEP § 2113. Therefore, these limitations have not been given patentable weight.

However, as to claim 11, Tsujioka does not expressly teach that a separator for fuel cell is obtained by blending the water repellent carbonaceous material of claim 1 with a binder resin, and shaping it.

Gyoten et al. teaches a fuel cell with electroconductive separator made up of a metal substrate and electroconductive resin layer provided on the surface of the metal substrate (Abstract; 3:19-21). The electroconductive resin layer has a resin having water-repellant or basic radicals, and an electroconductive particulate substance, such as a carbon powder (Abstract). The reference also describes producing a separator by knead-blending the resin composition in a ball-mill and applying the resin to one side of a stainless steel sheet where the resulting layer is 15 μm in thickness (e.g., see 5:37-49).

One of ordinary skill in the art would appreciate that that the separator of Gyoten does involve some degree of shaping. The broadest reasonable interpretation of “shaping” includes all degrees of shaping regardless of how nominal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to produce the separator of Tsujioka as taught by Gyoten to prevent corrosion of a metallic separator substrate due to water passing through and coming into contact with it by placing a water-repellant layer atop the substrate (see Gyoten, 3:29-36).

Regarding claim 13, product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. See MPEP § 2113. Therefore, these limitations have not been given patentable weight.

However, as to claim 13, the limitations of this claim have been addressed above with respect to claims 7 and 11 except for the resin being of a thermosetting type.

Tsujioka also teaches a substrate is covered with a mixture of the composite grains and an adhesive and subsequently hardened to form a water-repellent layer on the substrate's surface (4:5-10). The adhesive of the adhesive layer may be an epoxy resin or a urethane resin (4:51-53).

It is noted that the Applicant has disclosed that an epoxy resin is a thermosetting resin on p. 3 of its application.

Therefore, at the time of the invention, that artisan would have found it obvious to produce a separator, as taught by Gyoten et al. discussed above, using the dispersion and thermosetting resin of

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Tsujioka because a thermosetting resin can assist in adhering the water-repellant carbonaceous material to the surface of separator's substrate.

15. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al.

Regarding claims 1 and 5-6, product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps. See MPEP § 2113. Therefore, these limitations have not been given patentable weight.

Further, as to claims 5-6, if the body of a claim fully and intrinsically sets forth all of the limitations of the claimed invention, and the preamble merely states, for example, the purpose or intended use of the invention, rather than any distinct definition of any of the claimed invention's limitations, then the preamble is not considered a limitation and is of no significance to claim construction. See MPEP § 211.02 (II). However, as to a carbonaceous material for a fuel cell, Shimizu discloses a battery (e.g., a fuel cell) that uses electroconductive carbonaceous materials (1:37-39, 8:27-30).

As to claim 1, Shimizu teaches a water repellent carbonaceous material (Abstract).

As to claim 5, the reference teaches that the carbonaceous material is at least one of carbon black and graphite (1:37-39).

As to claim 6, the reference discloses that the water repellent material is a fluorocarbon resin [tetrafluoroethylene-perfluoro (alkyl vinyl ether) copolymer or a non-fibril-forming tetrafluoroethylene polymer] (Abstract).

Correspondence / Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edu E. Enin-Okut whose telephone number is 571-270-3075. The examiner can normally be reached on Monday-Thursday, 8 a.m. - 4 p.m.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward, can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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